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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/068,270	05/04/1998	KENJI UCHIYAMA	9319S-000062	2146
7590 03/11/2004 G GREGORY SCHIVLEY HARNESS DICKEY & PIERCE PO BOX 828 BLOOMFIELD HILLS, MI 48303			EXAMINER MITCHELL, JAMES M	
			ART UNIT 2827	PAPER NUMBER

DATE MAILED: 03/11/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No. **09/068,270**

Applicant(s)

UCHIYAMA, KENJI

Examiner

James M. Mitchell

Art Unit

2827

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 22 December 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1, 2 and 4-27 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 2 and 4-27 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. In claims 1,2, 4-8, 15, 16 and 17-25, it is unclear how the term "amoebiform" further modifies the scope of the term "spaces." Therefore, one of ordinary skill in the art would not be reasonably apprised of the scope of the claims. To further clarify, the term *amoebiform* means: *of the shape or appearance of an amoeba*; however, the particular shape or appearance of an amoeba that describes the spaces cannot be determined.

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 8, 18, 24, 25 and 26 are rejected under 35 U.S.C. 102(b) as being anticipated by Sato (02164230).
5. Sato (Fig 1) discloses semiconductor device (2) connecting structure for connecting a device onto a substrate (4), characterized by a bonding layer (3) including a resinous bonding material interposed between said device and said substrate (upper

surface) adhering the device to the substrate, and a plurality of adjacent amoebiform spaces (5) formed within said bonding material that has an inherent action to absorb (English Purpose: prevent substrate from being deformed) of said device; wherein the device is inherently adhered to the substrate by the bonding material at a substantially plane center portion of said device (via bonding material on a center portion of said device); within bonding material positioned between said spaces; and the bonding layer inherently deforms to accommodate relative movement of the device and substrate (via semiconductor).

6. Claim 9 is rejected under 35 U.S.C. 102(b) as being anticipated by Takeshi (EP 051071).

7. Takeshi (Fig 2) discloses a semiconductor connecting method for connecting a semiconductor device onto a substrate, characterized by comprising steps of: interposing a bonding layer between said semiconductor ("IC") and said substrate (Column 1, Lines 42-45); joining said substrate and said device to each other by pressing a pressurizing head (Fig 2B), heated to a high temperature against said semiconductor device (Column 1, Lines 48-50) to pressurize and heat said bonding layer and forming a plurality of spaces within said bonding layer (Column 1-2, Lines 58-3); wherein the heat process of bonding layer inherently decreases viscosity (Admitted by applicant, Spec. p. 5) of said bonding layer to cause said bonding layer to flow outward from said device; said spaces spanning (spread from device to substrate) from said device to said substrate.

***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 2-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato as applied to claims 1 and further in combination with Andrews (US 5,352,926), Muramatsu (U.S 5,893,623).

10. Sato further disclose that said bonding layer larger than mounting area (via adhesive protrudes beyond said device), but not disclose a bumps arranged in rows, or that said bonding layer is an epoxy.

11. However Andrews (Fig 1) utilizes an electrical connection through bumps (34).

It would have been obvious to one of ordinary skill in the art to form the electrical connection as a flip chip with bumps, such that the vacant spaces are between bumps in order to lower inductance as taught by Andrews (Col. 1, Lines 15-20).

12. Maramatsu utilizes an epoxy based adhesive (Lines 60-61, Column 7).

13. It would have been obvious to one of ordinary skill in the art to use an epoxy based bonding layer within a semiconductor device in order to increase moisture resistance as taught by Maramatsu (Lines 61-62, Column 7).

14. With respect to the limitation of plurality of bumps arranged in rows, since applicant failed to timely traverse examiner's statement of official notice, the well known use of bumps or balls in rows are deemed accepted and traversal waived.

15. With respect to claims 5 and 6, the prior art shows an inherent percentage of spaces to bonding layer (Sato: density is uniform per unit volume; Abstract), but does not appear to disclose that the percentage of spaces said bonding material is 5% to 70%.

16. However, it would have been obvious to one ordinary skill in the art to form the percentage of spaces within the bonding layer from 5% to 70%, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233 (CCPA 1955)

17. Claims 11-17 and 19-23, 26 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's admitted prior art (APA) in combination with Sato and Andrews.

18. APA discloses a LCD connected between two substrates (Page 2, Paragraph 1), a semiconductor device connected to a substrate (Page 2, Paragraph 2 and 3) that has an inherent periphery that defines a mounting area, with a anisotropic conductive film bonding layer (Page 2, Paragraph 2) interposed between said substrate and said device, that inherently includes conductive particles forming bumps in a resin that connect to a plurality of electrode terminals.

19. The disclosed prior art does not show a plurality of amoebiform spaces formed within a bonding layer, however the modified structure of Sato and Andrews utilizes amoebiform spaces (5; various shapes) close to each other within a bond layer that is larger than the mounting area and between conductive bumps.

20. It would have been obvious to one of ordinary skill in the art to form amoebiform spaces (via any shape) within bond layer between conductive bumps and in the mounting area in order to prevent deformation as taught by Sato (English Procedure).

21. With respect to claims 15 and 16 neither the admitted prior art nor Sato or Andrews appear to disclose that the percentage of spaces said bonding material is 5% to 70%.

22. However, it would have been obvious to one ordinary skill in the art to form the percentage of spaces within the bonding layer from 5% to 70%, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233 (CCPA 1955).

23. With respect to claim 21, APA does not appear to disclose that the adhesive layer is larger than the mounting area.

24. In any case, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose these particular dimensions because applicant has not disclosed that the dimensions are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears prima facie that the process would possess utility using another dimension. Indeed, it has been held that mere dimensional limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See, for example, In re Rose, 220 F.2d 459, 105 USPQ 237 (CCPA 1955); In re

Rinehart, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); In re Dailey, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

25. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takeshi (EP 051071) as applied to claim 9 and further in combination with Muramatsu (U.S. 5,893,623).

26. Takeshi does not appear to show that the bonding layer is epoxy based. See paragraphs 12 and 13.

### ***Response to Arguments***

27. Applicant's arguments filed October 24, 2003 have been fully considered but they are not persuasive. Applicant contends that Takeshi does not teach that spaces are formed by decreasing viscosity of the bonding material, but merely teaches heating an adhesive to form bubbles. Examiner respectfully disagrees since applicant has already admitted (Spec. p. 5: When the temperature of pressurizing head is given to the bonding material the viscosity decreases) can be achieved when the temperature of the pressurizing head/ arm is given to the bonding material.

### ***Conclusion***

28. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Paniccia (US 6,246,098). Paniccia is provided to further evidence the use of rows of bumps for increased contact.



Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James M. Mitchell whose telephone number is (571) 272-1931. The examiner can normally be reached on M-F 6:30-3:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamand Cuneo can be reached on (571) 272-1957. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Jmm



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PRIMARY EXAMINER